VIA FAX 571-273-8300

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

The Commissioner of Patents

Applicant: Mobius

Title: Power Combiner

S/N: 10/733,883 (a divisional application of 10/128,187)

Filing date: Dec 15, 2003

Examiner: Glenn

GAU 2817

Ref: Notice of Abandonment dated Aug 15, 2005

PETITION TO WITHDRAW HOLDING OF ABANDONMENT FILED UNDER 37 CFR 1.8(b) and MPEP 703.11

FAX 1/21

REMARKS

Applicant petitions for withholding of abandonment under 37 CFR 1.8(b) in the above referenced case, for the reasons stated below:

1) In reply to the office action of Jan 27 2005 in the above referenced case, applicant responded with the attached Amendment filed under 37 CFR 1.111, which included a certificate of mailing by first class mail under 37 CFR 1.8 The amendment was mailed via first class mail in an envelope addressed to the "Commissioner of Patents" P.O. Box 1450, Alexandria, VA 22323-1450 on April 26, 2005.

2) On August 18, 2005, applicant received a notice of abandonment dated Aug 15, 2005 for failure to reply to the office action of Jan 27, 2005.

3) Applicant is filing this petition to withdraw holding of abandonment less than 2 months from mailing of notice of abandonment.

4) Statement by Agent for Applicant:
I personally executed the certificate of mailing for the above amendment, and mailed it by first class mail with the United States Postal Service on April 26, 2005.

Applicant has attached a copy of the amendment mailed as described above. Applicant requests withholding of

Fax 2/21

abandonment in this case and entry of the April 26, 2005 amendment.

Respectfully Submitted,

Jay Chesavage

Registration No. 39,137

Fax 3/21

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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AMENDMENT FILED UNDER 37 CFR 1.111

Fax 4/21

In the claims:

38 (Previously presented) A power combiner having:

a central axis about which is disposed a plurality k of cylindrical feed waveguides, each said feed waveguide having a radius, an input port and a launching port, all centered on a feed waveguide axis, said launching port including a cylindrical helix;

a plurality k of focusing reflectors, one for each said feed waveguide, each said focusing reflector centered on said feed waveguide axis;

a final waveguide coaxial to said central axis and collecting power reflected by each said focusing reflector with a proximal final waveguide reflector port.

39 (Currently amended) The power combiner of claim 38 where

(1/π) arc cos ~~(p/X_{pq})~~ (m/X_{mn}) is an integer, when

said ~~p~~ m = azimuthal wave number

said ~~q~~ n = radial wave number

said ~~X_{pq}~~ X_{mn} = the eigenvalue of the mode.

40 (Previously presented) The power combiner of claim 38 where said feed waveguide launch port helical section is

Fax 5/21

formed by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said radius from and parallel to said feed waveguide axis, where θ is the angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

41 (Previously presented) The power combiner of claim 38 where said final waveguide is a cylinder.

42 (Previously presented) The power combiner of claim 38 where said feed waveguide axis is parallel to said central axis.

43 (Previously presented) The power combiner of claim 38 where each said feed waveguide radius is equal to each other said feed waveguide radius.

44 (Previously presented) The power combiner of claim 38 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

45 (Currently amended) The power combiner of claim ~~38~~ 40 where each said feed waveguide helical section angle $\theta = 0$ is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

Fax 6/21

46 (Currently amended) The power combiner of claim ~~38~~ 40 where each said feed waveguide helical section angle $\theta \neq 0$ is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

47 (Previously presented) The power combiner of claim 38 where said feed waveguide helical launch port has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

K_{perp} is the perpendicular wave number.

48 (Cancelled)

49 (Previously presented) The power combiner of claim 38 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

FAX 7/21

50 (Previously presented) The power combiner of claim 49 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus point, and a perpendicular line which is perpendicular to said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

51 (Previously presented) The power combiner of claim 38 where each said k reflectors, has an angular extent about said central axis ~~is~~ of 360/k degrees.

52 (Currently amended) The power combiner of claim 38 where each said ~~input waveguide~~ feed waveguide input port is coupled to a source of asymmetric traveling wave power~~, said input power traveling~~ which travels through each said feed waveguide, ~~reflecting~~ reflects from said reflector and is collected in said final waveguide.

53 (Previously presented) The power combiner of claim 38 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

54 (Previously presented) The power combiner of claim 38 where each said feed waveguide, each said reflector, and said final waveguide include an electrically conductive surface.

55 (Currently amended) A power combiner comprising:

a plurality k of feed waveguide cylinders, each said feed waveguide cylinder having a feed waveguide axis and a radius, and also having a launch end which includes a helical cut ramp;

FAX 9/21

a cylindrical final waveguide having a central axis;

a plurality said k of reflectors interposed between said feed waveguide launch end and said final waveguide, each reflector for directing wave energy from said feed waveguide cylinder to said final waveguide;

where k is n integer greater than 1.

56 (Currently amended) The power combiner of claim 55 where

(1/n) arc cos ~~(p/X_{pq})~~ (m/X_{mn}) is an integer, when

said ~~p~~ m = azimuthal wave number

said ~~q~~ n = radial wave number

said X_{pq} X_{mn} = the eigenvalue of the mode.

57 (Previously presented) The power combiner of claim 55 where said feed waveguide launch port helical section is formed by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said radius from and parallel to said feed waveguide axis, where θ is the angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

58 (Previously presented) The power combiner of claim 55 where said feed waveguide axis is parallel to said central axis.

Fax 10/21

59 (Previously presented) The power combiner of claim 55 where any said feed waveguide radius is equal to any other said feed waveguide radius.

60 (Previously presented) The power combiner of claim 55 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

61 (Previously presented) The power combiner of claim ~~55~~ 57 where each said feed waveguide helical section angle θ =0 is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

62 (Previously presented) The power combiner of claim ~~55~~ 57 where each said feed waveguide helical section angle θ =0 is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

63 (Previously presented) The power combiner of claim 55 where said feed waveguide helical launch port has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

K_{perp} is the perpendicular wave number.

64 (Previously presented) The power combiner of claim 55 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

65 (Previously presented) The power combiner of claim 64 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

Fax 12/21

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus point, and a perpendicular line which is perpendicular to said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

66 (Previously presented) The power combiner of claim 55 where said plurality comprises k feed waveguides and k reflectors, and the angular extent of each said reflector about said central axis is 360/k degrees.

67 (Currently amended) The power combiner of claim 55 where each said ~~input~~ feed waveguide is coupled to a source of asymmetric traveling wave power, said ~~input~~ wave power traveling through each said feed waveguide, reflecting from said reflector and ~~collected~~ collecting in said final waveguide.

FAX 13/21

68 (Previously presented) The power combiner of claim 55 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

69 (Previously presented) The power combiner of claim 55 where each said feed waveguide, each said reflector, and said reflector waveguide include an electrically conductive surface.

70 (Currently amended) A power combiner comprising:

k feed waveguides, each said feed waveguide formed from a 4 sided polygon conductor comprising a rectangle having a width and height adjoining a triangle having same said height, said polygon then rolled into a cylinder with ~~an~~ a feed waveguide axis substantially parallel to said rectangle width thereby forming said feed waveguide, said feed waveguide having a feed waveguide radius about said feed waveguide axis and a feed waveguide launch end adjacent to said triangle;

a cylindrical final waveguide having a central axis;

a plurality said k of reflectors positioned between said k feed waveguides and said final waveguide input end;

where k is greater than 1.

Fax 14/21

71 (Currently amended) The power combiner of claim 70 where

(1/n) arc cos ~~(p/X_{pq})~~ (m/X_{mn}) is an integer, when

said ~~p~~ m = azimuthal wave number

said ~~q~~ n = radial wave number

said X_{pq} X_{mn} = the eigenvalue of the mode.

72 (Currently amended) The power combiner of claim 70 where said feed waveguide launch port helical section is formed by sweeping a line of length $L_{feedlaunch} = \theta * L_{launch}/2*pi$ at said feed waveguide radius from and parallel to said feed waveguide axis, where θ is the angle in radians about said feed waveguide axis and said L_{launch} is the length of the helical cut.

73 (Previously presented) The power combiner of claim 70 where said feed waveguide axis is parallel to said central axis.

74 (Previously presented) The power combiner of claim 70 where each said feed waveguide radius is equal to each other said feed waveguide radius.

FAX 15/21

75 (Currently amended) The power combiner of claim 70 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

76 (Currently amended) The power combiner of claim ~~70~~ 72 where each said feed waveguide helical section angle θ =0 is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

77 (Previously presented) The power combiner of claim ~~70~~ 72 where each said feed waveguide helical section angle θ =0 is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

78 (Currently amended) The power combiner of claim 70 where said feed waveguide helical launch ~~port~~ end has a helical cut depth

$$L_{feedlaunch} = 2\pi\{k_{par}\,sqrt\{1-(m/X_{mn})^2\}/\{k_{perp}\cos^{-1}(m/X_{mn})\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

FAX 16/21

K_{perp} is the perpendicular wave number.

79 (Currently amended) The power combiner of claim 70 where said reflector is formed by a curve extruded along said central axis, said reflector curve comprising a locus of points.

80 (Currently amended) The power combiner of claim 79 where said locus of points satisfies the following criteria for each given locus point:

where each said feed waveguide has a circular feed caustic and a feed caustic phase front, and said final waveguide has a circular final caustic and a final caustic phase front, for each point on said locus, a first line segment starting from said locus point, touching said feed caustic and ending on said feed caustic phase front, and a second line segment starting on said locus point, touching said final caustic and ending on said final caustic phase front:

a) the path length of said first line segment added to said second line segment is a constant,

b) at each said locus point, an intersection point is defined by the intersection of said locus point and a line which is tangent to said reflector curve at said locus

FAX 17/24

point, and a perpendicular line which is perpendicular to said tangent line at said locus point, said perpendicular line bisecting the angle formed by said first line segment and said second line segment.

81 (Previously presented) The power combiner of claim 70 where said plurality comprises k feed waveguides and k reflectors, and the angular extent of each said reflector about said central axis is 360/k degrees.

82 (Currently amended) The power combiner of claim 70 where each said ~~input~~ feed waveguide is coupled to a source of asymmetric traveling wave power~~, said input power~~ traveling through each feed waveguide, reflecting from said reflector and collected in said final waveguide.

83 (Previously presented) The power combiner of claim 70 where each said feed waveguide, each said reflector, and said final waveguide are electrically conductive.

84 (Currently amended) The power combiner of claim 70 where each said feed waveguide, each said reflector, and said ~~reflector~~ final waveguide include an electrically conductive surface.

REMARKS

This is an amendment filed under 37 CFR 1.111 and responsive to the office action dated Jan 27, 2005. Claims 38, 40-44, 47, 49-51, 53-55, 57, 59, 60, 63, 66, 68-70, 74, 81, and 83 were allowed in the office action of Jan 27, 2005.

With regard to the 35 USC 112 rejection of claims 39, 56, and 71, applicant notes that azimuthal wavenumber index p and radial wave number q are merely arbitrary variables assigned to mode indices known in the prior art of travelling wave modes, and fully defined in the specification paragraph starting on page 4 line 5. However, to exactly correspond to the specification recitation of the same formulas with m and n as indices on page 21 lines 10-16 for asymmetric travelling waves, the claims have been amended to make reference to m and n rather than p and q. With regard to the examiner statement that arc cos term does not relate to the physical structure of the power combiner, applicant notes the penultimate sentence found on page 21 line 17-18, which notes that when the product formed on page 21 line 13 (including the constituent multiplicative $\cos^{-1}$ term) is an integer, the final waveguide 88 can be a simple cylinder. The indices m and n reference the travelling wave

FAX 19/21

modes best supported by than the structure. Reconsideration is requested.

With regard to the 35 USC 112 rejection of claims 45, 46, 61, 62, 76, and 77 for lack of antecedent basis for "said feed waveguide helical section angle", these dependant claims now rely on dependant claims 40, 40, 57, 57, 72, 72, respectively, which contain the limitation "feed waveguide helical section angle".

With regard to the 35 USC 112 rejection of claims 52, 67, and 82 for lack of antecedent basis for "said input waveguide" and "said input power", applicant has amended these claims to make antecedent reference to "feed waveguide input port" and removed the reference to "said input power".

With regard to the 35 USC 112 rejection of claims 58, 64, 73, 76, 77, and 79 for lack of antecedent basis for "said central axis", this term has been amended into claims 55, 55, 70, 72, 72, and 70, respectively.

With regard to the 35 USC 112 rejection of claim 72 for lack of antecedant basis for the term "said radius" and "said feed waveguide axis", independant claim 70 properly referenced "each said feed waveguide...rolled into a cylinder with an axis". Nevertheless, claim 70 has been amended to explicity reference "feed waveguide axis" and "feed waveguide radius" in amended claims 70 and 72.

With regard to the 35 USC 112 rejection of claim 75 for lack of antecedant basis for the term "said feed waveguide radius", the previously referenced amendment of claim 70 addresses this matter.

With regard to the 35 USC 112 rejection of claims 76 and 77 for lack of antecedant basis of "said feed waveguide center axis", these claims have been amended to delete the word "center" and now depend on claim 72.

With regard to the 35 USC 112 rejection of claim 78 for lack of antecedant basis for "said feed waveguide helical launch port", this claim has been amended to reference the "launch end" found in independent claim 70.

With regard to the 35 USC 112 rejection of claim 84 for lack of antecedent basis for "said reflector waveguide", the claim has been amended to reference "said final waveguide".

Reconsideration is requested for the above claims.

With this amendment, the present application is in condition for allowance.

Respectfully Submitted,

Jay Chesavage

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Fax 21/21

Aug 24 05 11:00a Jay Chesavage 650-494-3835 p.21